

Washington University in St. Louis

## Washington University Open Scholarship

---

Volume 13

Washington University  
Undergraduate Research Digest

---

Spring 2018

### Isolation and Genomic Analysis of Phage PumpkinSpice

Brandon Chia

*Washington University in St. Louis*

Mackenzie Cunningham

*Washington University in St. Louis*

Paul Rice

*Washington University in St. Louis*

Tiana Saak

*Washington University in St. Louis*

Follow this and additional works at: [https://openscholarship.wustl.edu/wuurd\\_vol13](https://openscholarship.wustl.edu/wuurd_vol13)

---

#### Recommended Citation

Chia, Brandon; Cunningham, Mackenzie; Rice, Paul; and Saak, Tiana, "Isolation and Genomic Analysis of Phage PumpkinSpice" (2018). *Volume 13*. 37.

[https://openscholarship.wustl.edu/wuurd\\_vol13/37](https://openscholarship.wustl.edu/wuurd_vol13/37)

This Abstracts A-I is brought to you for free and open access by the Washington University Undergraduate Research Digest at Washington University Open Scholarship. It has been accepted for inclusion in Volume 13 by an authorized administrator of Washington University Open Scholarship. For more information, please contact [digital@wumail.wustl.edu](mailto:digital@wumail.wustl.edu).

## ISOLATION AND GENOMIC ANALYSIS OF PHAGE PUMPKINSPICE

*Brandon Chia, Mackenzie Cunningham, Paul Rice, and Tiana Saak*

*Mentors: Kathy Hafer and Chris Shaffer*

Our objective is to isolate and characterize a novel bacteriophage, a virus that infects bacteria, to add to the knowledge base of both bacteriophage genetics and molecular and microbiology. The bacteriophage studied in-depth here is PumpkinSpice, isolated from the bacterial strain *Streptomyces griseofuscus*. PumpkinSpice is one of the first phages to be isolated using this bacterial host strain. To carry out this project, we collected an environmental sample from the Washington University in St. Louis campus just outside of Dardick House from which we isolated and purified phage PumpkinSpice. From there, we extracted PumpkinSpice DNA, performed gel electrophoresis to gain an initial genome size estimate, and took electron microscopy photos to determine the phage's physical structure. The electron microscopy results showed that PumpkinSpice had a flexible tail that was approximately 319 nm long and an icosahedral head that was approximately 76 nm wide (left-right) and 78 nm long (top-bottom). These results lead us to believe that PumpkinSpice is a Siphoviridae. After sequencing, it was found that the PumpkinSpice genome is 132,480 base pairs in length, with 246 protein-coding genes and 44 tRNA-coding genes. PumpkinSpice also has a direct terminal repeat that is 12,588 base pairs long. After our wet lab experiments, PumpkinSpice was sequenced and we positionally annotated its genome using tools like protein Blast and auto-annotation programs Glimmer and GeneMark. We are currently working on functional annotations to determine the specific purpose of the genes found in PumpkinSpice. PumpkinSpice is hypothesized to be a lytic phage based on the small, clear plaques. PumpkinSpice belongs to the BE2 cluster, with high similarities to bacteriophages Starbow, Tom Sawyer, and Wipeout.